BENCHMARK™
05.04.04 - 06.05.04
HALF-GANTRY TYPE CNC AND MANUAL
COORDINATE MEASURING MACHINE
**BENCHMARK**

**STRUCTURE:** Coordinate Measuring Machine, CNC or Manual type, with aluminum alloy mobile half-gantry structure on granite table machine base

**SURFACE PLATE:** Granite table with integrated guide-ways with flatness to DIN876/III and M8 threaded insert grid

**GUIDEWAYS:** X axis machined into granite table (left) and micromachined and hard anodized alloy extrusions (right), Y axis micro-machined and hard anodized alloy extrusions, Z axis micro-machined and hard anodized alloy extrusions

**DRIVE METHOD:** NC drive via DC motors (Mot) or Manual Knob for each axis (MAN) with zero hysteresis friction drive on steel bar to all axes

**BEARING SYSTEM:** Air bearings to all axes

**MEASURING SYSTEM:** High resolution (0,1μm) free floating linear scales mounted in carriers

**COUNTERBALANCE:** Adjustable pneumatic on Z ram

**THERMAL COMPENSATION:** C3TCOMP Wireless multi-sensors for measuring scales and part (Optional)

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**BENCHMARK: SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Models</th>
<th>Specification according to ISO 10360-2:2009</th>
<th>Max. 3D Pos. Speed</th>
<th>Max. 3D Accel.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MAN</td>
<td>MOT only</td>
<td></td>
</tr>
<tr>
<td>TPC3/MH20i-TP20</td>
<td>[\mu m]</td>
<td>[mm/s]</td>
<td>[mm/s²]</td>
</tr>
<tr>
<td>MH20i/PH10T/M/PH20-TP20</td>
<td>[\mu m]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PH10T/M-TP20</td>
<td>[\mu m]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PH20-TP200</td>
<td>[\mu m]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>05.04.04</td>
<td>3.0 + L/300</td>
<td>3.0</td>
<td>500</td>
</tr>
<tr>
<td>06.05.04</td>
<td>3.2 + L/300</td>
<td>3.2</td>
<td>500</td>
</tr>
</tbody>
</table>

Performance data are only valid if the following specifications are met:
- MH20i/PH10T/M/PH20-TP20/TP200: SF Module, Tip diameter Ø 4 mm x Stylus length 10 mm
- L = measuring length in mm
- Ambient temperature Range:
  \( T: 18 \pm 22 °C; \text{Max. Gradients: 0.5 *K/h - 2.0 *K/24h - 0.5 *K/m} \)

\( ^{(1)} \) Maximum permissible Error for size measurements according ISO 10360 2:2009

\( ^{(2)} \) Maximum limit for repeatability range according ISO 10360 2:2009

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**PERFORMANCE VERIFICATION**

**E_{L,MPE}:** Maximum permissible Error for size measurements
Measurement of a set of 5 different sizes, measured through two different probing points on two nominal parallel planes. The set of 5 sizes are placed in 7 different position aligned along the 3 linear axes and along 4 volumetric diagonal directions. Each size is measured 3 times for a total of 105 \( E_{L} \) measurements. All 105 measurements must be within the limit of tolerance \( E_{L,MPE} \).

**R_{0,MPL}:** Maximum limit for repeatability range
Evaluation of 35 repeatability values calculated as the maximum value minus the minimum value of 3 different measured size for each of 5 sizes for each of 7 positions. Each of these 35 values \( R_{0} \) has to be less than the maximum limit \( R_{0,MPL} \).
### STROKES, DIMENSIONS, WEIGHTS

#### Measuring Strokes

<table>
<thead>
<tr>
<th>Models</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
<th>LX</th>
<th>LY</th>
<th>HZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>05.04.04</td>
<td>500</td>
<td>400</td>
<td>440</td>
<td>929</td>
<td>888</td>
<td>2411</td>
</tr>
<tr>
<td>06.05.04</td>
<td>600</td>
<td>500</td>
<td>440</td>
<td>1044</td>
<td>1018</td>
<td>2411</td>
</tr>
</tbody>
</table>

#### Overall Dimensions

<table>
<thead>
<tr>
<th>Height</th>
<th>Thickness</th>
<th>Length</th>
<th>Width</th>
<th>Holes</th>
<th>Daylights</th>
<th>Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>GH (1)</td>
<td>GT</td>
<td>GL</td>
<td>GW</td>
<td>GD1</td>
<td>D1</td>
<td>D2</td>
</tr>
<tr>
<td>830</td>
<td>100</td>
<td>930</td>
<td>673</td>
<td>135</td>
<td>135</td>
<td>598</td>
</tr>
<tr>
<td>830</td>
<td>100</td>
<td>960</td>
<td>803</td>
<td>150</td>
<td>150</td>
<td>598</td>
</tr>
</tbody>
</table>

#### Surface Plate

<table>
<thead>
<tr>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>Max. Part Weight</th>
<th>Machine Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>145</td>
<td>141</td>
<td>156</td>
<td>300</td>
<td>650</td>
<td>190</td>
</tr>
</tbody>
</table>

#### Weights

<table>
<thead>
<tr>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>Max. Part Weight</th>
<th>Machine Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>300</td>
<td>390</td>
<td>267</td>
<td>252</td>
<td>300</td>
</tr>
</tbody>
</table>

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(1) With PH20 Probe Head Z Measuring stroke will be reduced to 410 mm
**TECHNICAL CHARACTERISTICS**

**STRUCTURE**

Coordinate Measuring Machine, CNC or Manual type, with aluminum alloy mobile half-gantry structure on granite table machine base  
- **Guideways:** X axis machined into granite table (left) and micromachined and hard anodized alloy extrusions (right).
- Y axis micro-machined and hard anodized alloy extrusions
- Z axis micro-machined and hard anodized alloy extrusions

**Drive Method:**
- X axis: zero hysteresis friction drive on steel bar
- Y axis: zero hysteresis friction drive on steel bar
- Z axis: zero hysteresis friction drive on steel bar

**Sliding System:** Air bearings on all axes

**Motion Control:**
- DC servomotor on all axes (MOT)
- Manual Knob for each axis (MAN)

**Thermal Compensation:** Multi-sensors temperature compensation system (total 4 sensors) in Option.

**Measuring System:** High resolution (0.1μm) free floating linear scales mounted in carriers

**PROBING SYSTEM**

- **Manual Probe Head:** TPC3, MIH, MH20, MH20i, MH8, RTP20
- **Motorized Probe Head (MOT version only):** PH10T, PH10M, PH20
- **Point-to-point Trigger Probe:** TP20, TP200, TP200B
- **Stylus and Probe Changer:** Fully automated stylus and probe changers

**ENVIRONMENT**

**Temperature Range for Metrological Specification:**
- Ambient Temperature Range: 18 ÷ 22 °C
- Max. gradient per hour: 0.5 °K/h
- Max. gradient per day: 2.0 °K/24h
- Max. gradient in space: 0.5 °K/m

**Operating Temperature:**
- 15 ÷ 35 °C

**Relative Humidity:**
- 40 ÷ 80 % (non condensing)

**Acceptable Vibrations:**
- (vibration acceleration between peaks)
  - 30 mm/s² from 1 to 10 Hz
  - 15 mm/s² from 10 to 20 Hz
  - 50 mm/s² from 20 to 100 Hz

**AIR SUPPLY**

- **Air Consumption:** 90 Nl/min
- **Minimum Air Supply:** 5 Bar (71PSI)

**POWER SUPPLY**

- **Power Supply Voltage:**
  - 230 V ± 10%; 50 Hz ± 2% (single phase) - 15 A
  - 115 V ± 10%; 60 Hz ± 2% (single phase)
- [Power consumption may vary according PC/peripherals connected to the Controller]

**OPTION**

- Passive vibration insulating system
- Active vibration insulation system (AVM)
- Multi-wire cable

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